

26th World Gas Conference

1 – 5 June 2015, Paris, France



TS TF 2.1

Relationship between coal & gas

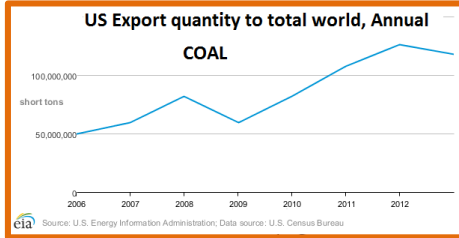
Giulia Migueles Pereyra

Regulatory Affairs, Legislative Strategies and Relations
with Authorities ENI

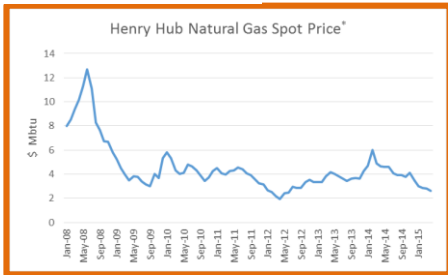


Gas and coal: a close relationship

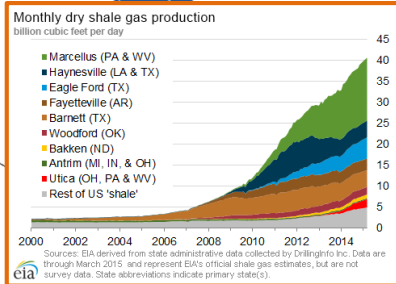
3) Increase in coal export



2) Decrease of USA spot prices

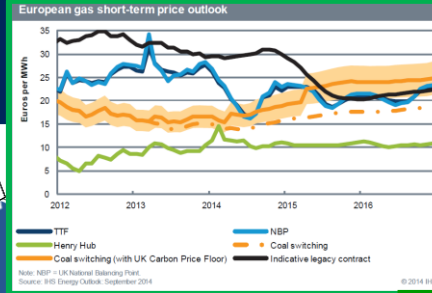


1) Enormous growth of shale gas production



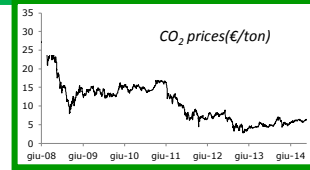
DECARBONISATION POLICIES

DEMAND GROWTH

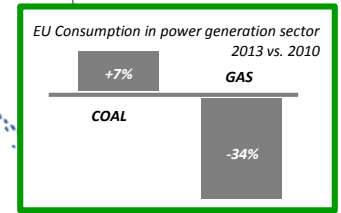


4) Impact on prices

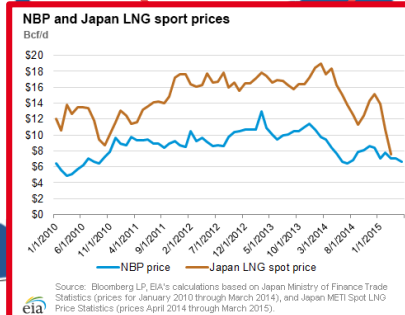
Economic crisis and low CO₂ prices



5) Change in consumptions



6) Impact on LNG prices

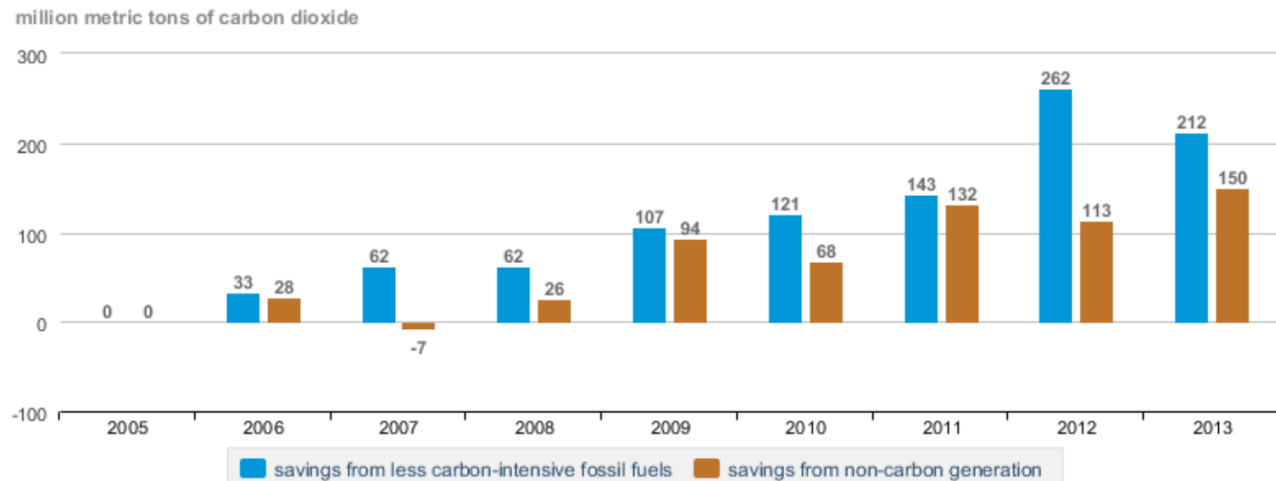


and then...

US - Shale gas revolution

- The «golden age of gas» experimented in the US is the **concrete demonstration** of the positive effects that the coal to gas switch could have in the power generation sector
- It has been estimated that fuel substitution from high-carbon old technologies to lower-carbon efficient technologies, like CCGT, **can reduce emissions in the power sector by 58%**, at relatively low cost, relative to 1990*

Electric power sector carbon dioxide savings since 2005 from less carbon-intensive fossil fuels and from non-carbon generation, 2005-13



Source: U.S. Energy Information Administration, Monthly Energy Review (September 2014), Tables 12.1 and 1.1. Population growth, Census Bureau as of September 3, 2014. GDP, Bureau of Economic Analysis, as of July 31, 2014.



The European environmental policies

Evolution of the EU policies

The 2020 climate and energy package:

- ✓ 20% reduction of GHG
- ✓ + 20% share of EU energy consumption produced from renewables
- ✓ + 20% EU's energy efficiency

2030 framework for climate and energy policies:

- ✓ 40% reduction of GHG
- ✓ +27% share of EU energy consumption produced from renewables
- ✓ +27% EU's energy efficiency

Roadmap 2050:

- ✓ 80% - 95% reduction of GHG

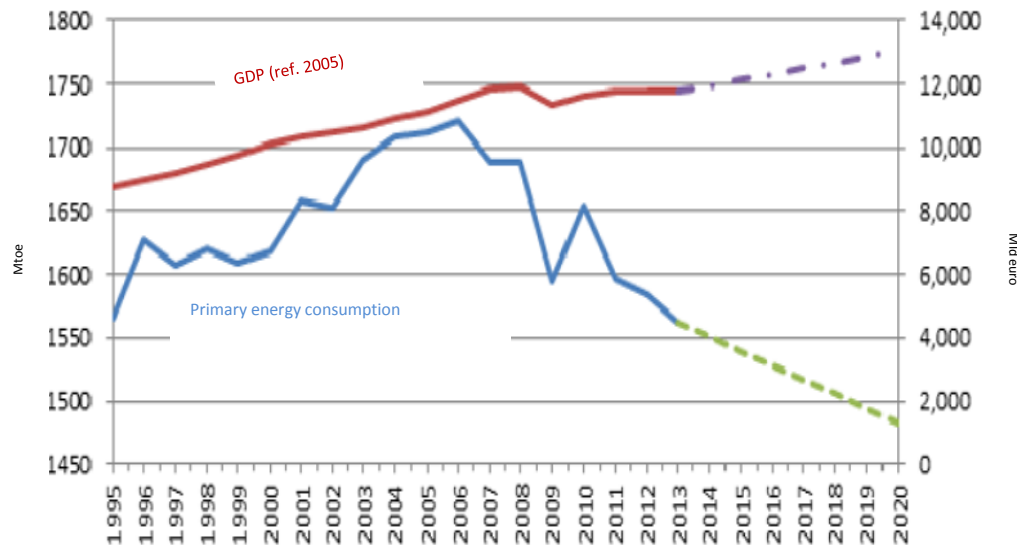
2020

2030

2050

The European strategy is consolidate and it is a long term vision

The effect on the fundamentals

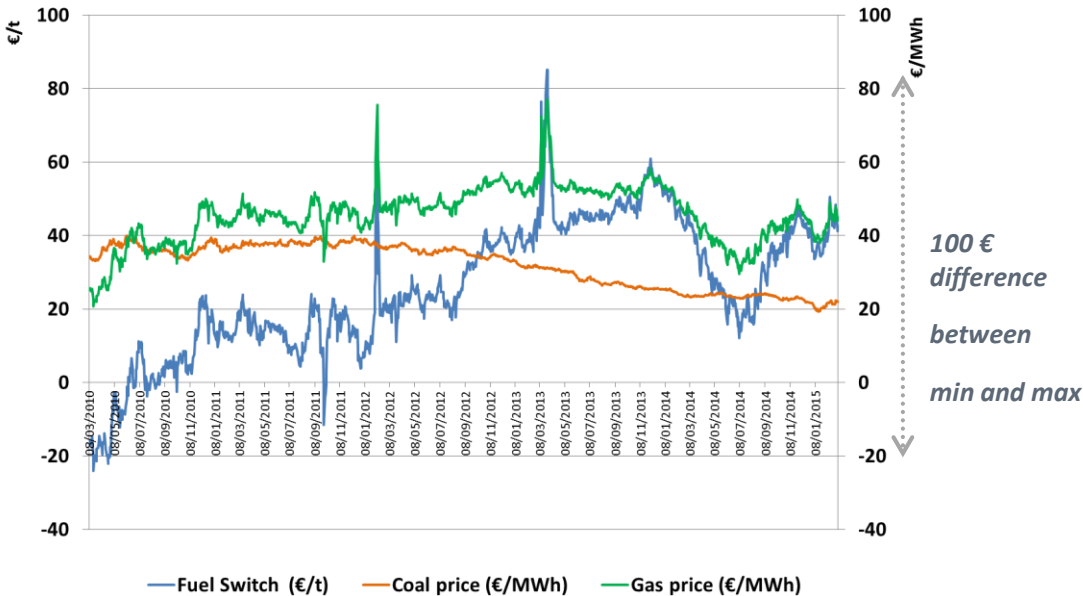


...and it has given already significant results

* Source: Eurostat; proiezioni del consumo energetico primario sulla base delle raggiungimento del target 20%; proiezioni PIL sulla base di un tasso di crescita dell'1,5%

The European bottle neck

Fuel switch volatility in 2010-2014

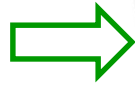


- Despite the significant effort, **the price signal of the policies has not been strong enough**
- In the last three years **coal-fired generation rose by 12% while gas-fired generation experienced a 24% drop**
- A growing number of operators has started to **mothball or decommission their CCGTs** In the next 3 years in Germany 7 GW of new coal capacity could be built and, at the same time, 10 GW of gas generation could be mothballed

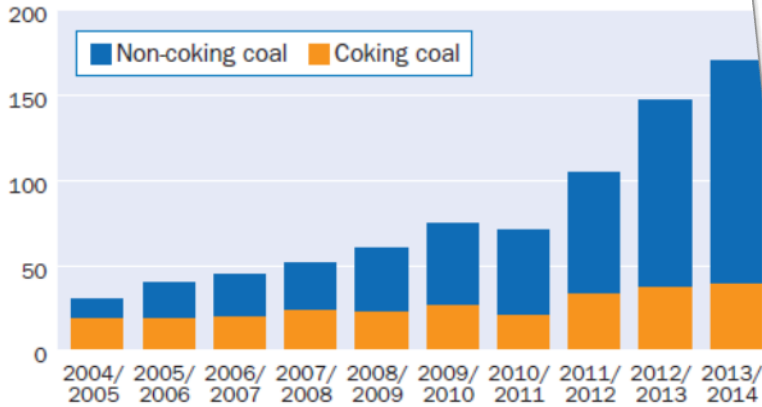
* Assumptions: Coal and gas prices are calculated in euros per MWh of electricity generated. Price reference: API 2 for coal, TTF for gas. Efficiency: coal 36%, gas 50%. Emission factors: coal 940 kgCO₂/MWh, gas 403 kgCO₂/MWh. Coal energy content 25.1 GJ/t

The Asian way

The **environmental problems** are leading the pattern of some Asian countries through the reduction of the harmful emissions



India coal imports (million mt)

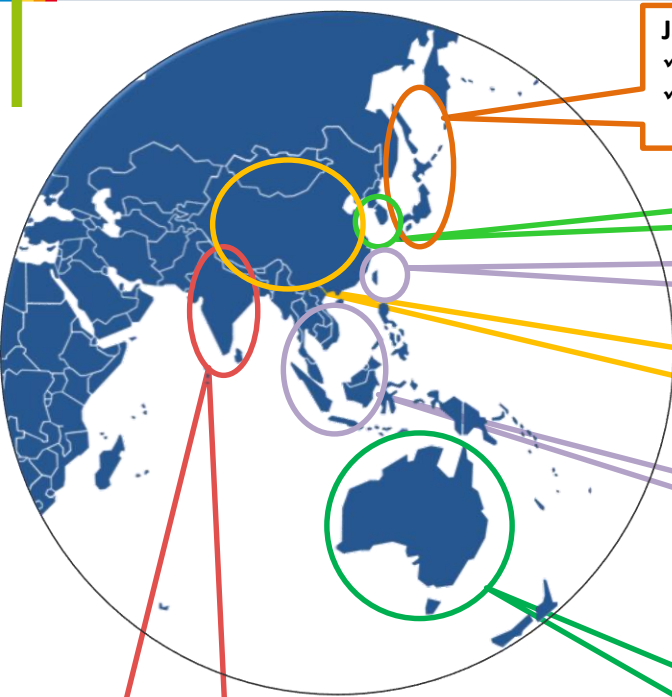


Source: Coal Ministry



At the same time **coal** is playing (and it will be also in future) a **crucial role** in the energy mix

The Asian way



Japan:

- ✓ Gradual denuclearization
- ✓ Policy push for **imported coal and gas**

South Korea:

- ✓ International LNG and coal market
- ✓ **Carbon cap and trade scheme**

Taiwan:

- ✓ High **coal** input for **electricity**

China:

- ✓ Reliance on **domestic coal**
- ✓ Policy push for renewables -17% CO₂ intensity by the end of 2015

SEA:

- ✓ Emerging as a **major coal consuming** region

India:

- ✓ **Increasing coal demand**
- ✓ Price subsidies

Australia:

- ✓ **Carbon tax** legislation
- ✓ Renewable energy target

The same problems as for Europe could emerge !

EPS – a tool for reestablishing the competitive relationship between coal and gas

An Emission Performance Standard (EPS) is a regulatory tool that establishes [a maximum level of emissions for a power plant](#).

The application of an EPS could be designed in different way:

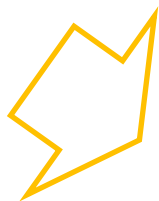
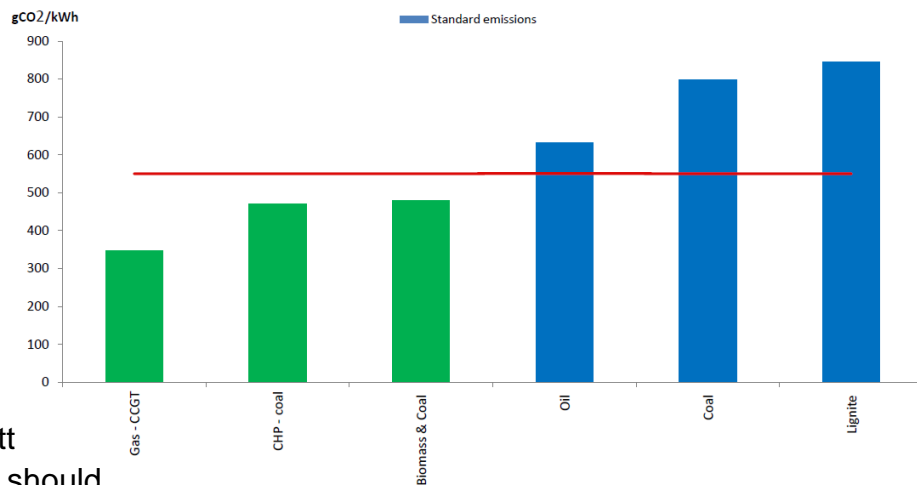
- An EPS **per unit** of electrical output from a power plant (CO₂e).
- A **portfolio basis**, where the threshold is calculated on the annual production average of a producers' portfolio,
- A **plant based emission bubble** would limit a plant's annual total operational emissions of CO₂, essentially creating a "bubble" that each plant is able to emit within a year.
- An EPS on **all plants** would be the most effective in cutting carbon emissions,
- An EPS on **newly built plants and refurbishments** if designed appropriately, can limit the redirection of capital to prolonging the life of existing coal facilities .
- Applying an EPS to **new plants only** to provide a clear signal for new investments. However, this would have limited impact on emissions and on the most polluting power plants.



In any case the key element is the threshold...

Thresholds for EPS

- **800 gCO₂/kWh**: only the most efficient coal plant could **Remain on the market**. It also has an impact on the less efficient natural gas power generation plants.
- **500 gCO₂/kWh**: this threshold is suitable for **CCGT** plants. To reach this level, the coal plants need the combined use of **CCS** technology and at least a 30% of biomass to be added in the combustion
- **350 gCO₂/kWh**: the **new gas power generation plants of big size** characterized by an high level of efficiency could emit less than this threshold. For **coal** plants the use of **biomass** should reach the **50%**.
- **150 gCO₂/kWh**: in this case also the **natural gas** plants need the **support of CCS** or of the integration with **bio-methane** or biomass.



In the short term EPS could the phase-out of the most inefficient coal plants



Thank you for your attention



BACK UP

Europe – power emissions

2013 – EU power emission

Mt CO₂

